PATENT ABSTRACTS OF JAPAN

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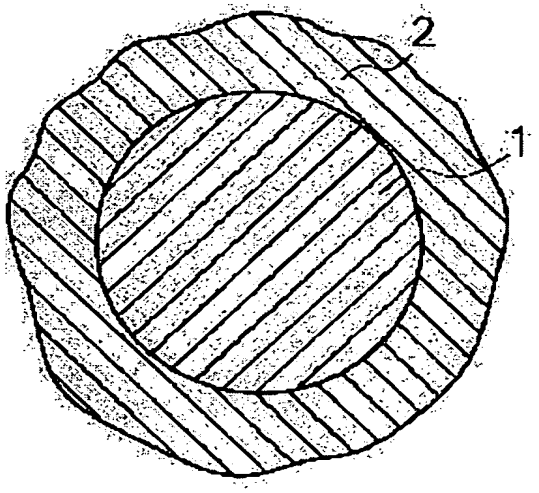
(71)Applicant : SANKEN ELECTRIC CO LTD
(72)Inventor : TACHIIRI HIDEFUMI

(54) FLUORESCENCE PARTICLE HAVING COATED LAYER AND METHOD FOR PRODUCING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a fluorescent particle having a coated layer with environmental resistance and ultraviolet resistance.
SOLUTION: This fluorescent particle (1) has a coated layer (2) which comprises a glass such as a polymetalloxane having light transmission, etc., or a ceramic such as nitrogen silicon-based ceramic and is formed approximately on the whole surface. The fluorescent particle is provided with environmental resistance and ultraviolet resistance.



CLAIMS

[Claim(s)]
[Claim 1]A fluorescence particle having the enveloping layer which comprised glass or ceramics which has a light transmittance state, and was formed over a substantially entire surface.
[Claim 2]The fluorescence particle according to claim 1 whose glass is poly metalaw KISAN.

[Claim 3]The fluorescence particle according to claim 1 whose ceramics are nitrogen silicon system ceramics.
[Claim 4]A fluorescence particle given in any 1 paragraph of claims 1-3 closed in a resin material which has a light transmittance state.
[Claim 5]A fluorescence particle given in any 1 paragraph of claims 1-3 which comprise poly metalaw KISAN in which said enveloping layer was formed from a metal alkoxide.
[Claim 6]Said metal alkoxide $Ti(OCH_3)_4$, $Ti(OC_2H_5)_4$, A single metal alkoxide or La[aluminum $(iso-OC_3H_7)_{43}$, such as $Ti(iso-OC_3H_7)_4$ and $Ti(OC_4H_9)_4$, Mg[aluminum$(iso-OC_3H_7)_4]_2$, Mg [aluminum$(sec-OC_4H_9)_4]_2$, nickel[aluminum$(iso-OC_3H_7)_4]_2$, The fluorescence particle according to claim 5 which are a 2 metal alkoxide or multi-metal alkoxides, such as $Ba[Zr_2(C_2H_5)_9]_2$ and $_2(OC_3H_7)$ Zr[aluminum$(OC_3H_7)_4]_2$.
[Claim 7]A process of a fluorescence particle which has covering characterized by comprising the following.
A process of dissolving a metal alkoxide or a ceramics precursor into an organic solvent, and forming sol.
A process of spraying sol on a granular fluorescent substance and forming a tunic of a metal alkoxide or a ceramics precursor on the surface of a fluorescent substance.
A process of forming an enveloping layer which calcinates said tunic and changes from glass or ceramics to the surface of said fluorescent substance.

[Claim 8]A process of a fluorescence particle which has the covering according to claim 7 including a process of forming said enveloping layer by making metalaw KISAN (metaloxane) combination into a subject.
[Claim 9]A process of the fluorescence particle according to claim 7 including a process of forming said enveloping layer by making gel siloxane (siloxane) combination into a subject.
[Claim 10]A process of a fluorescence particle given in any 1 paragraph of claims 7-9 including a process of forming said enveloping layer which gives a sol-gel method to a metal alkoxide and changes from poly metalaw KISAN to it.
[Claim 11]A process of a fluorescence particle given in any 1 paragraph of claims 7-10 including a process of forming said enveloping layer which carries out hydrolytic polymerization of the solution containing a metal alkoxide or a metal alkoxide with a sol-gel method, and comprises poly metalaw KISAN.
[Claim 12]Said metal alkoxide $Ti(OCH_3)_4$, $Ti(OC_2H_5)_4$, A single metal alkoxide or La[aluminum $(iso-OC_3H_7)_{43}$, such as $Ti(iso-OC_3H_7)_4$ and $Ti(OC_4H_9)_4$, Mg[aluminum$(iso-OC_3H_7)_4]_2$, Mg [aluminum$(sec-OC_4H_9)_4]_2$, nickel[aluminum$(iso-OC_3H_7)_4]_2$, $Ba[Zr_2(C_2H_5)_9]_2$, (OC_3H_7) A process of the fluorescence particle according to claim 7 or 8 which are a 2 metal alkoxide or multi-metal alkoxides, such as $_2Zr$[aluminum$(OC_3H_7)_4]_2$.
[Claim 13]A process of the fluorescence particle according to claim 7 in which said ceramics precursor is polysilazane.
[Claim 14]A process of the fluorescence particle according to claim 7 whose temperature which calcinates said tunic is 120-160 **.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention belongs to the fluorescence particle which has the enveloping layer provided with the fluorescence particle which changes the wavelength of the light which received light especially ultraviolet rays-proof, or heat resistance, and its process.
[0002]
[Description of the Prior Art]If the large semiconductor light emitting element of a band gap (energy gap) is used, the semiconductor emission device which emits light on the comparatively short wavelength from visible light with short wavelength to an ultraviolet area or a near ultraviolet region is realizable. The semiconductor light emitting element which generates ultraviolet radiation can comprise nitrogen gallium system compound semiconductors, such as GaN, GaAlN, InGaN, and InGaAlN, and can be used for the new source of solidification ultraviolet radiation provided with various advantages, such as small size, low power consumption, and a long life.
[0003]
[Problem(s) to be Solved by the Invention]Generally, although a semiconductor light emitting element is covered with the resin sealed body constituted with the organic polymer compound which elements, such as carbon, hydrogen, oxygen, and nitrogen, combined with mesh shape, If these ultraviolet rays are irradiated by the enclosure body which comprises epoxy system resin, and the resin sealed body which changes, the knot of an organic high polymer is cut and it is known that various kinds of optical characteristics and chemical property will deteriorate. For example, since the blue light diode chip of GaN (gallium nitride) emits light in ultraviolet rays to the wavelength of about 365 nm, a resin sealed body turns yellow gradually from the circumference of a light emitting diode chip with strong light intensity, and a coloring phenomenon generates it. For this reason, the visible light which the light emitting diode chip emitted is absorbed by a coloring section, and is decreased. Since moisture resistance falls with degradation of a resin sealed body and ionic permeability increases, the light emitting diode chip itself deteriorates and, as a result, the luminescence intensity of a light emitting diode device is reduced synergistically.
[0004]In order that a resin sealed body with low heat resistance may turn yellow and color, when the light irradiated from the light emitting diode chip passes a resin sealed body, it is decreased. For example, also by the forward current in which the blue light diode chip of GaN (gallium nitride) with high forward voltage is comparatively low, power loss is large and chip temperature rises considerably at the time of an operation. moreover -- deteriorating gradually, if resin is generally heated by the elevated temperature -- yellowing -- causing - coloring is known. Therefore, if the light emitting diode chip of GaN is used for the conventional light emitting diode device, in order that resin may turn yellow and color gradually from the portion which touches a hot light emitting diode chip, the appearance quality and luminescence intensity of a light emitting diode device fall gradually. Thus, in the conventional light emitting diode device, it becomes a cause which invites reduction of the material kind to choose, the fall of reliability, the imperfection of a light conversion function, and the rise of a product price.
[0005]Drawing 3 shows the sectional view of the conventional light emitting diode device which changes the wavelength of the light irradiated from a light emitting diode chip with a fluorescent substance (7a). In the light emitting diode device (20) shown in drawing 3. A light emitting diode chip (12) adheres to the bottom (3b) of the crevice (3a) of the external terminal (3) as a lead by the side of a cathode, and the cathode terminal of a light emitting diode chip (12) is connected to the upper bed part (9a) of the external terminal (3) by the side of a cathode by the lead

small-gage wire (5). The anode electrode of a light emitting diode chip (12) is connected to the upper bed part (9b) of the external terminal (4) as a lead by the side of an anode by the lead small-gage wire (6). The light emitting diode chip (12) which adhered to the crevice (3a) is covered with the protection resin (7) of a light transmittance state in which it filled up in the crevice (3a), and the fluorescent substance (7a) was mixed. The crevice (3a) of the external terminal (3) by the side of a light emitting diode chip (12) and a cathode and an upper bed part (9a), the upper bed part (9b) of the external terminal (4) by the side of an anode, and a lead small-gage wire (5, 6) are further enclosed in sealing resin (8) of a light transmittance state.
[0006]If voltage is impressed between the external terminal (3) by the side of the cathode of a light emitting diode device (20), and the external terminal (4) by the side of an anode and it energizes to a light emitting diode chip (12), The light irradiated from a light emitting diode chip (12) is emitted to the exterior of a light emitting diode device (20) through transparent sealing resin (8), after reflecting through the inside of protection resin (7) by the side attachment wall (3c) of the crevice (3a) of an external terminal (3). There is also light directly emitted to the exterior of a light emitting diode device (20) through protection resin (7) and sealing resin (8) without emanating from the upper surface of a light emitting diode chip (12), and being reflected by the side attachment wall (3c) of a crevice (3a). The light which a lens part (8a) is formed at the tip of sealing resin (8), and passes through the inside of sealing resin (8) is condensed by the lens part (8a), and directivity is improved. At the time of luminescence of a light emitting diode chip (12), the light irradiated from a light emitting diode chip (12) is changed and emitted to the wavelength which changes with fluorescent substances (7a) mixed in protection resin (7). As a result, the light of different wavelength from the light irradiated from the light emitting diode chip (12) is emitted from a light emitting diode device (20).
[0007]
[Problem(s) to be Solved by the Invention]There is a problem on which coated resin and a fluorescent substance deteriorate by the ultraviolet-rays ingredient generated from a light emitting diode chip (12). If ultraviolet rays are irradiated with protection resin (7) and sealing resin (8) which are generally constituted with the organic polymer compound which elements, such as carbon, hydrogen, oxygen, and nitrogen, combined with mesh shape, the knot of an organic high polymer is cut and it is known that various kinds of optical characteristics and chemical property will deteriorate. For example, the blue light diode chip of GaN (gallium nitride), Since it has luminescent components in an ultra-violet wave length region with a wavelength of 380 nm or less besides light components, coated resin turns yellow gradually from the circumference of a light emitting diode chip with strong light intensity, a coloring phenomenon occurs, and the visible light which a light emitting diode chip emits is absorbed by a coloring section, and is decreased. Since moisture resistance falls with degradation of coated resin and ionic permeability increases, the light emitting diode chip itself deteriorates and, as a result, the luminescence intensity of a light emitting diode device (20) is reduced synergistically.
[0008]There is a fluorescent substance which deteriorates by ultraviolet rays as well as coated resin. For example, causing a what is called "melanism" phenomenon which the fluorescent substance of a zinc sulfide system causes a photolysis by radiation or ultraviolet rays, and zinc separates is known. If the fluorescent substance in coated resin produces a photolysis, the luminescence intensity of a light emitting diode device (20) will fall remarkably.
[0009]In order to prevent degradation of coated resin by ultraviolet rays and a fluorescent substance, how to mix an ultraviolet absorption substance into coated resin is also considered, but the light components themselves must not be absorbed but the ultraviolet absorption substance which does not have an adverse effect on the original characteristic of coated resin must be selected carefully. Since the material and the process of operation which are used additionally increase when adopting an ultraviolet absorption substance, there is a difficulty that a product price rises.
[0010]Since the ultraviolet-rays light emitting diode chip which emits ultraviolet rays cannot be used, it is also a problem to receive the restriction when the material selection of a fluorescent substance and the luminescent characteristic of a light emitting diode device are big. Many fluorescent substances in which the fluorescent substance for ultraviolet rays excited by the

ultraviolet rays used for a fluorescent lamp or a mercury lamp has luminous wavelength distribution various now as a result of performing development and improvement for many years and whose light conversion efficiency it is cheap and is high are put in practical use. If the fluorescent substance for an ultraviolet-rays light emitting diode chip and ultraviolet rays is combined, it will be expected that the light emitting diode device of the color tone which is more brightly [still] varied is obtained. However, in the conventional light emitting diode device in which resin deteriorates by ultraviolet rays, an ultraviolet-rays light emitting diode chip cannot be used, and the outstanding fluorescent substance cannot be used. Thus, in the conventional light emitting diode device, if a fluorescent substance is blended into resin, said problem will arise, and it becomes a cause which invites reduction of the material kind which is chosen for this reason, the fall of reliability, the imperfection of a light conversion function, and the rise of a product price. * NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The sectional view of the fluorescence particle which has an enveloping layer by this invention
[Drawing 2]The sectional view of a fluid bed type coating device
[Drawing 3]The sectional view of the conventional light emitting diode device
[Description of Notations]
(1) .. Fluorescence particle, (2) .. Enveloping layer, (3) .. The first external terminal, (3a) .. a crevice and .. (3b) -- a pars basilaris ossis occipitalis and .. (3c) -- side attachment wall, (4) .. the second external terminal. (5) .. the -- lead small-gage wire of one, (6) .. the -- lead small-gage wire of two, (8) .. a cover body (sealing resin). (9a, 9b) .. Upper bed part, (10) .. Fluid bed type coating device, (11) .. Barrel, (12) .. Semiconductor light emitting element (light emitting diode chip), (13) .. Effluence-of-gas mouth, (14) .. Table, (15) .. Nozzle, (16) .. Feed pipe, (17) .. Gas stream entrance, (20) .. Light emitting diode device (emitting semiconductor device),

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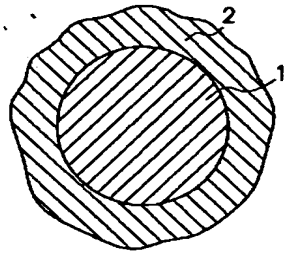
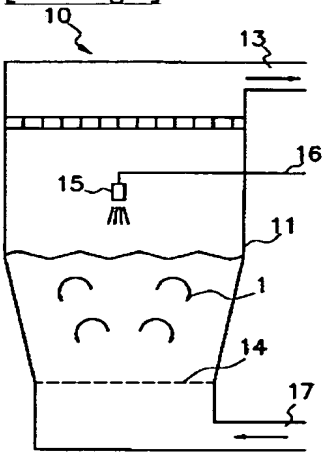
DRAWINGS

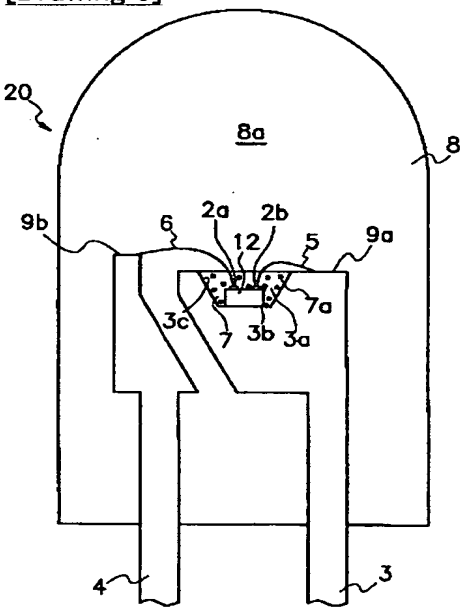
[Drawing 1]



[Drawing 2]



[Drawing 3]



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